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| **“The value of biodiversity is the sum of all of its parts”** | | | |
| **NAMES:** | | | |
| **UNIT:** Plants, Anatomy, Growth, and Function  **TITLE OF LESSON :** Biodiversity (Succession) | | | |
| **BIG IDEAS**:  Plant variety is critical to the survival and sustainability of ecosystems. | | **MATERIALS:**   * JENGA blocks * masking tape * chart paper * different coloured markers * projector | |
| **MINISTRY EXPECTATIONS**:  A1.11 communicate ideas, plans, procedures,  results, and conclusions orally, in writing, and/or  in electronic presentations, using appropriate  language and a variety of formats (e.g., data  tables, laboratory reports, presentations, debates,  simulations, models)  F3.4 describe the various factors that affect plant  growth (e.g., growth regulators, sunlight, water,  nutrients, acidity, tropism)  F3.5 explain the process of ecological succession,  including the role of plants in maintaining  biodiversity and the survival of organisms after  a disturbance to an ecosystem | |
| **STUDENT LEARNING GOALS**:   * understand succession in relation to biodiversity * recognize the importance of plant biodiversity * identify factors that decrease biodiversity * identify ways in which our society can help promote and maintain biodiversity | | **APPENDICES:**  **A1:** Notes for teacher on how to facilitate the JENGA ecosystem building activity  **B1:** Notes for teacher on toppling JENGA ecosystem loss of biodiversity  **B2:** Group handout sheet on infomercial  **C1:** Student Worksheet on review of plant biodiversity  **C2:** Teacher Worksheet: Exemplar Peer Copy  **C3:** Group handout on “ticket out of class” judge | |
| **PRIOR KNOWLEDGE:**   * from SNC1D includes biotic/abiotic factors of an ecosystem * from earlier in the class includes understanding biodiversity and ecosystems from the Diversity unit * from last lesson includes understanding the stages of succession | |
|  | **T/L STRATEGIES** | **RATIONALE** | **ASSESSMENT** |
| **A MINDS ON**  10- 15 minutes | Demo with building a JENGA tower ecosystem using succession  **Appendix A1** | -reviews terms used in the previous lesson on succession  -links succession to biodiversity | -apply understanding of terms by coming up with plant examples  -thumbs up/down class vote to the “Assessment for learning” question |
| **B**  **Action**  10-15 minutes | Toppling biodiversity and the JENGA tower ecosystem with demo and discussion.  **Appendix B1** | -illustrate how biodiversity affects the ecosystem  -identifies factors that reduce biodiversity | -questioning  -allow students to discuss and communicate |
| 25-30 minutes | Groups develop and present infomercial that promotes diversity  **Appendix B2** | -allows students to further explore how certain factors impact biodiversity  -challenge students to come up with real life solutions to how they can facilitate increasing biodiversity | -each group presents their opinions and responses to biodiversity in the form of a 1-2 minute docudrama |
| **C CONSOLID-ATION &**  **CONNEC-TION**  15-20 minutes | Discuss and complete a student worksheet that reviews the concepts of plant biodiversity with projector  **Appendix C1**  **Appendix C2** | -to highlight the BIG ideas  -to identify common student errors | -read handouts  -questioning during note-making |
| **NEXT STEPS**  5 minutes | Ticket out of class: biodiversity raters  -students will remain in their infomercial group and will complete a group ticket  **Appendix C3** | -assess student’s understanding of biodiversity  -allows them to practice their ability to assess biodiversity | -allows students to discuss and debate with their peers on biodiversity |

**Appendix A1**: Notes for teacher on how to facilitate the JENGA ecosystem building activity

**Setup:**

* Place masking tape on the ends of each JENGA block
* Hand one JENGA block to each student

**Facilitating the activity:**

* The teacher will help the class build an ecosystem out of JENGA blocks. The class will verbally outline the stages of ecological succession together
* The JENGA block tower (ecosystem) will then be assembled starting with the early stages of succession placed at the base of the tower
* As the students identify the stages of succession, the teacher will assign each student to come up with examples of species that fit in the specific succession stage with a focus on plant species
* The student will then write their specific example on the masking tape (on the ends of the JENGA block)

Assessment as learning question: Does succession aid in increasing, decreasing or have no change in the number of species in an ecosystem? (Thumbs up/down)

Teacher response: Yes, as an ecosystem goes through the stages of succession the number of species that are present in the ecosystem increases, which means more biodiversity is present.

**Appendix B1**: Notes for teacher on toppling JENGA ecosystem loss of biodiversity

* Teacher will ask students to pair with another student to brainstorm and discuss factors which may eliminate biodiversity (Think-Pair-Share), after the pair will share their ideas with the class
  + They will also state which species will be specifically affected in the JENGA ecosystem by the factor
* One student will be selected to write down each factor on the chalk board
* As each factor and effect is stated, the teacher will knock out the JENGA blocks from the JENGA ecosystem without returning them to the tower
* The less species that are present in the ecosystem, the more likely the ecosystem will collapse and be destroyed

**Appendix B2**: Group handout sheet on infomercial

Infomercial instructions

Each group (3-4 members) will be formed based off a shared category from the minds-on JENGA activity (for example: students who gave examples of colonizers in JENGA succession will be placed together). They will need to construct and present a (1-2 minute) infomercial. The following must be included in the presentation:

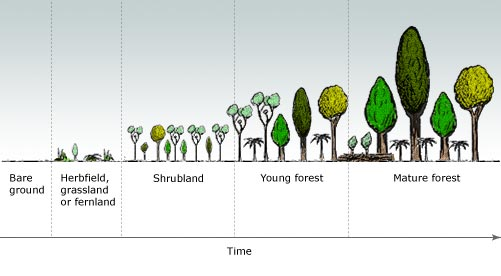
1. Choose 1 factor (on the chalkboard) that decreases biodiversity to be the topic of your infomercial
2. Choose an ecosystem which that factor will effect
3. Choose a target audience you want to engage/ what channel will your infomercial air on?
4. Present the effects your chosen topic has on biodiversity
5. Present what you want your audience to do to prevent the loss of biodiversity

Note: Students will be given chart paper and coloured markers, which can be used for planning, making props, visual representation of infomercial or used to take notes during the group discussion

\*Each member must have a role in the infomercial.

**Appendix C1**: Student Worksheet on review of plant biodiversity

1. What is biodiversity?
2. The diagram below shows the succession of an ecosystem over a period of time. What happens to biodiversity as the stages of succession progress?



1. Why is plant biodiversity important in an ecosystem?
2. What are the benefits of plant biodiversity for humans?

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| Benefit | Examples (Can be verbal or visual) |
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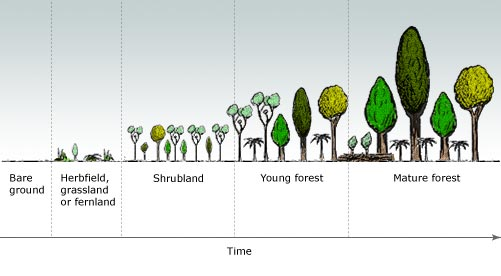
1. What are the present causes to a loss of biodiversity?

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| Causes | Examples (Can be verbal or visual) |
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1. How can we help biodiversity?

**Appendix C2**: Teacher Worksheet: Exemplar Peer Copy

1. What is biodiversity? The degree of variation of life forms within an ecosystem, biome, or planet.
2. The diagram below shows the succession of an ecosystem over a period of time. What happens to biodiversity as the stages of succession progress? Plant or producer biodiversity which brings about an increase in consumer biodiversity.



1. Why is plant biodiversity important in an ecosystem? Biodiversity is important to sustain the ecosystem that we are a part of.
2. What are the benefits of plant biodiversity for humans?

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| Benefit | Examples (Can be verbal or visual) |
| Human Health | Medicine |
| Agriculture | Fruit |
| Spiritual/Cultural Benefits | Crane as a symbol of prosperity in Chinese culture |
| Other: Economic, Social, Political Stability | Resource shortage can cause mass migration |

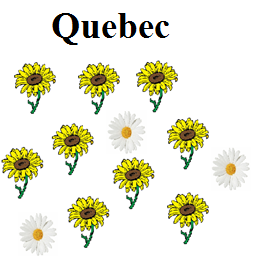
1. What are the present causes to a loss of biodiversity?

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| Causes | Examples (Can be verbal or visual) |
| Habitat Loss | Tropical rainforest deforestation |
| Overharvesting | Single-crop farms |
| Non-native Species | Dog Strangling Vine in Ontario |
| Global Environment Change/Pollution | Acid rain, global warming, ozone depletion, pesticides |

1. How can we help biodiversity? Sustainable energy, reduce pesticides, get involved with an ecological restoration project in your area etc.

**Appendix C3:** Group handout on “ticket out of class” judge

Each group has been hired to become judges for a prestigious gardening competition. The judges will have to discuss as a group which garden has the least biodiversity and which garden has the most biodiversity. Your final decision will be submitted at the end of class

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**Judges final decision:**

Garden(s) with the least biodiversity is/are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Garden(s) with the most biodiversity is/are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_